US005253386A

United States Patent [19]

LaLonde

[11] Patent Number: 5,253,386

[45] Date of Patent: Oct. 19, 1993

[54] **BRUSH FOR CLEANING INTERIOR OF A TUBE OR THE LIKE**

[76] Inventor: **Anthony F. LaLonde**, 2469 Klein Rd., San Jose, Calif. 95148

[21] Appl. No.: **733,372**

[22] Filed: **Jul. 22, 1991**

Related U.S. Application Data

[63] Continuation of Ser. No. 545,699, Jun. 28, 1990, abandoned.

[51] **Int. Cl.**[5] **A46B 3/18**

[52] **U.S. Cl.** **15/206**; 15/104.2; 15/164

[58] **Field of Search** 15/206, 104.2, 104.33, 15/106, 160

[56] **References Cited**

U.S. PATENT DOCUMENTS

750,357	1/1904	Gibbons	15/104.2
1,154,369	9/1915	Browning	15/104.2
1,421,529	7/1922	Millhouse	15/160
2,272,419	2/1942	Meyer	15/164
2,290,534	7/1942	Cave	15/160
2,728,929	1/1956	Bell	15/160
2,895,155	7/1959	Peterson	15/192
2,897,525	8/1959	Goodwin et al.	15/104.2
3,085,272	3/1961	Weichselbaum	15/164
3,133,298	5/1964	Norwood	15/164
3,151,517	4/1963	Guinness	84/330
3,296,644	1/1967	Weisberg	15/206
3,591,885	7/1971	Fritzen	15/143 R
3,739,420	6/1973	Kafkis	15/211
4,030,199	6/1977	Russell	15/206
4,108,162	8/1978	Chikashige et al.	15/206
4,114,504	9/1978	Koregelos	84/453
4,387,479	6/1983	Kigyos	15/206
4,395,943	8/1983	Brandli	15/167
4,407,182	10/1983	Biasini	84/453
4,691,404	9/1987	Tarrson et al.	15/206
4,819,291	4/1989	Gunjian	15/160

FOREIGN PATENT DOCUMENTS

671738	9/1929	France	15/206
818278	8/1959	United Kingdom	15/104.2

Primary Examiner—Harvey C. Hornsby
Assistant Examiner—Patrick F. Brinson
Attorney, Agent, or Firm—Jack M. Wiseman

[57] **ABSTRACT**

A brush for a hollow structure with an open end includes brush bristles secured to a twisted wire. In one embodiment, a non-abrasive, heat-shrinking plastic tube is slip-fitted over the twisted wire at a section thereof that is free of brush bristles. The heat-shrinking plastic tube is heat-shrunk to form a tight fit with the twisted wire to form a brush handle therewith. In another embodiment, a non-abrasive solid cylindrical body is penetrated along the axis or center line thereof by a section of twisted wire that is free of brush bristles.

4 Claims, 1 Drawing Sheet

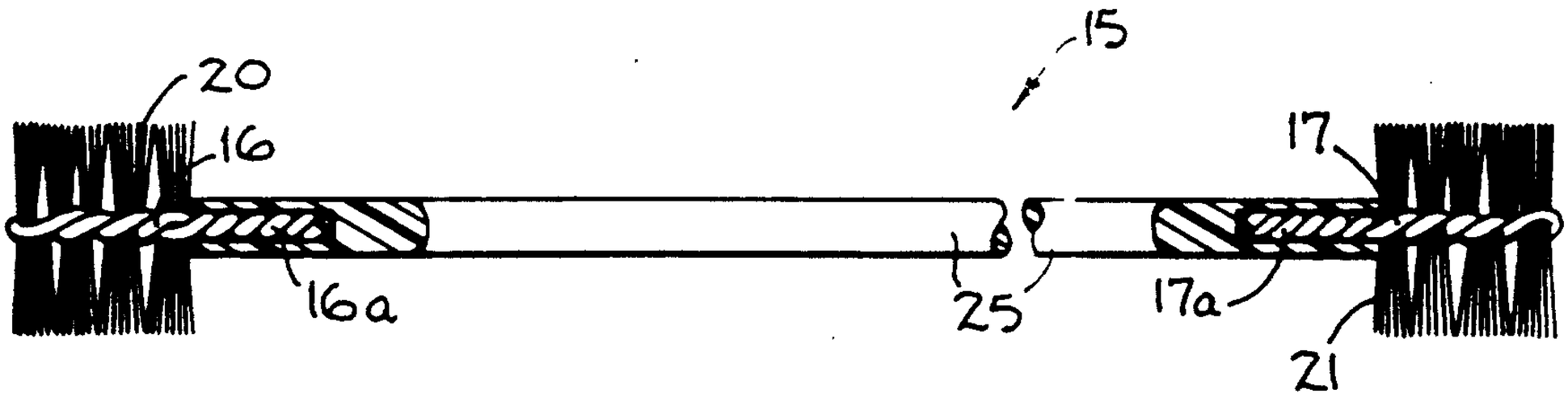


fig_1

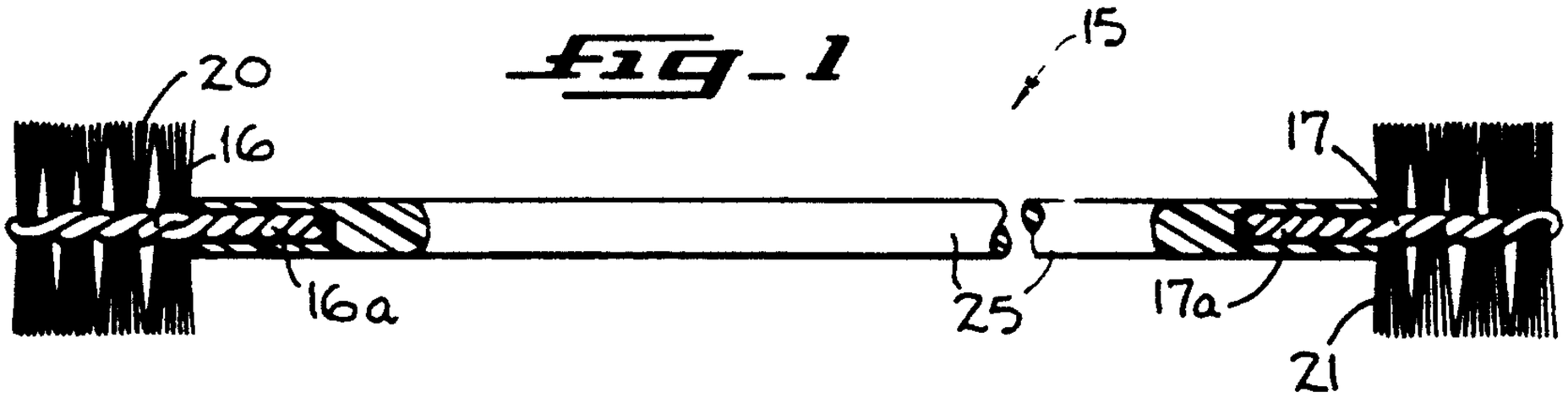
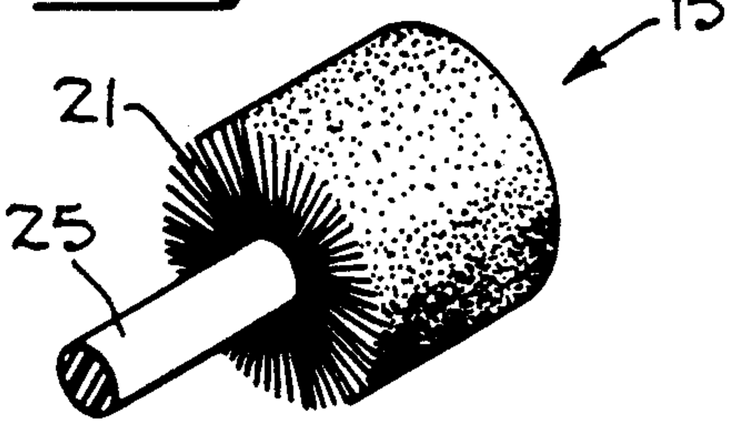


fig_1A



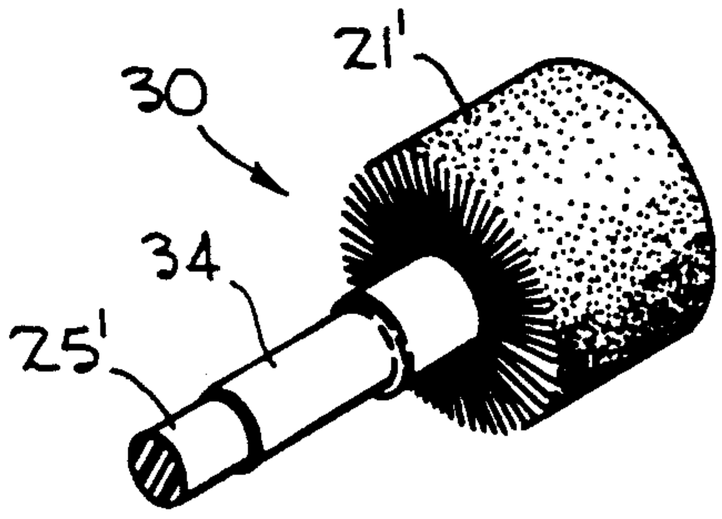
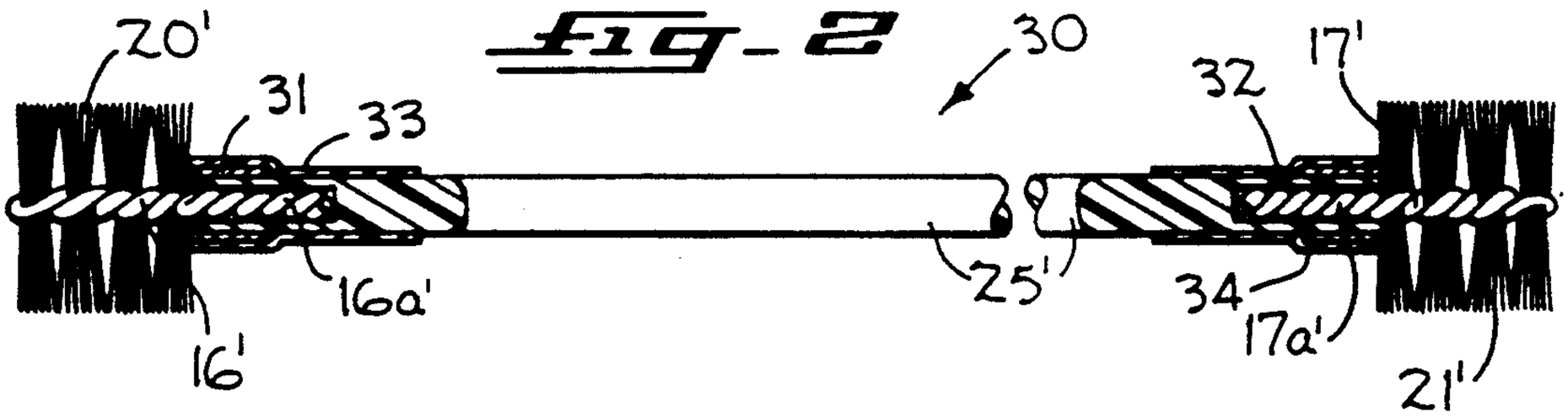


fig_2A

fig_2



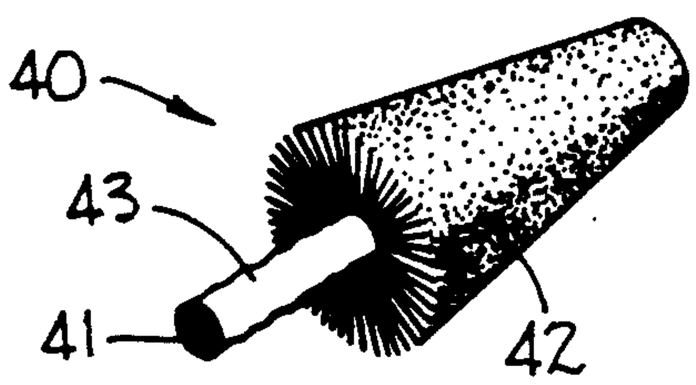
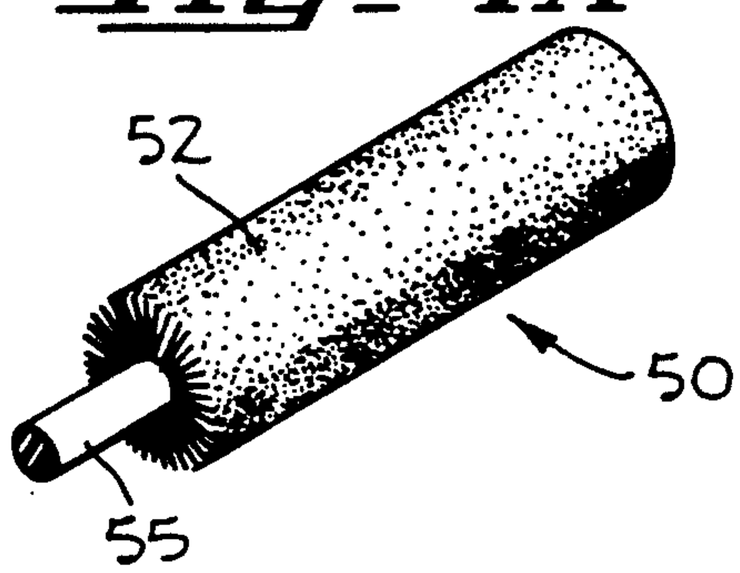


fig_3A

fig_4A



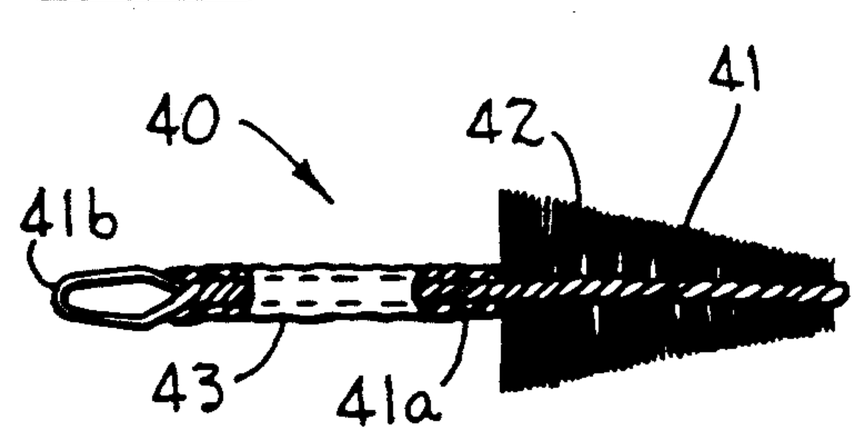
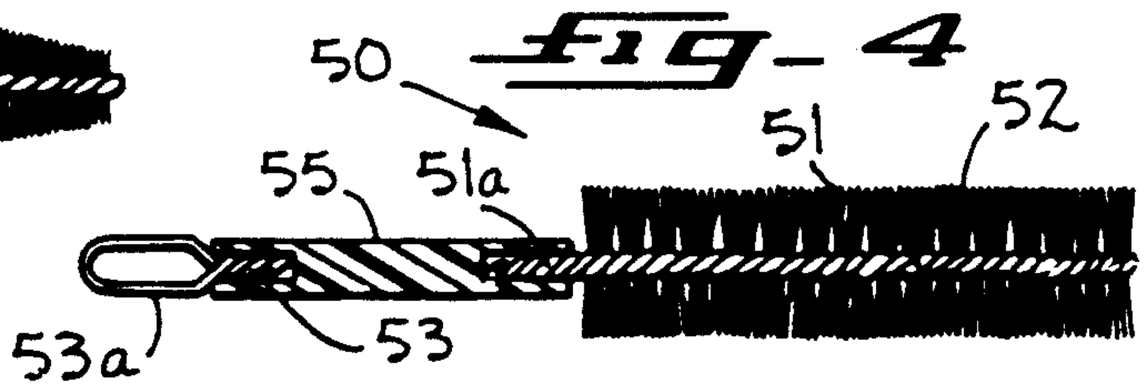


fig_3

fig_4



BRUSH FOR CLEANING INTERIOR OF A TUBE OR THE LIKE

This is a continuation of copending application Ser. No. 07/545,699 filed on Jun. 28, 1990, now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates in general to brushes, and more particularly to brushes for cleaning the interior of a tubular structure or the like.

The playing of musical instruments causes foreign substances to collect on the inner wall of the mouthpiece, the valves and the tubes of the wind instrument. It is caused by the breath of the instrumentalist collecting on the inner wall of the mouthpiece, the valves and the tubes of the wind instrument. Proper care of the wind instrument requires removal of the foreign substances from the mouthpiece, the valves and the tubes of the wind instrument.

Heretofore, the mouthpiece of the wind instrument was cleaned by a bristle brush having tapered bristles secured to a twisted wire handle. The valves of the wind instrument were cleaned by a bristle brush having bristles forming a cylindrical configuration. Brushes for the cleaning of the tubes of wind instruments were heretofore constructed from steel coiled wire connected to twisted wires with bristles secured to the free ends of the twisted wires. A sheath surrounded the steel coiled wire. Such coiled wire brushes would kink while in use. As a consequence of the kinking of the coiled wire brushes, the coiled wire brushes would lodge in the musical wind instrument and were difficult to remove from the tube. Such coiled wire brushes had the tendency not only to lodge within a tube, but also the steel coiled wire had a tendency to scratch the inner lacquer surface of the tube. Additionally, steel coiled wire had a tendency to oxidize and rust.

The U.S. Pat. to Peterson, No. 2,895,155, issued on Jul. 21, 1959, for Wire Stem Brush, discloses the wire stem of a wire stem brush coated with an elastomeric sheath. The elastomeric sheath is extruded on the wire stem or may be applied by means of a latex dip.

In the U.S. Pat. to Brandli, No. 4,395,943, granted on Aug. 2, 1983, for Interproximal Toothbrush, discloses a toothbrush with a wire stem. The wire stem is enclosed by a nylon or polyurethane material. The nylon or polyurethane material is applied to the wire stem by dipping or spraying. In the alternative, the nylon or polyurethane material may be in the form of a tube drawn over the wire.

In the U.S. Pat. to Weisberg, No. 3,296,644, issued on Jan. 10, 1967, for Wire Core Back Brush Assembly, there is disclosed two wire core brushes secured together by a flexible link. The link is made of flexible plastic material, such as nylon.

The U.S. Pat. to Norwood, No. 3,133,298, issued on May 19, 1964, for Plastic Brush For Washing Inside Of Bottles, discloses a nylon plastic body. Nylon bristles protrude radially and outwardly from the nylon plastic body.

In the U.S. Pat. to Weichselbaum, No. 3,085,272, issued on Apr. 16, 1963, for Test Tube Brushes, there is disclosed a test tube brush molded from a synthetic resin, such as polyethylene, polypropylene, polyvinyl acetate or similar resilient rubber-like material. The handle includes a stem from which scrubbing fingers project.

The U.S. Pat. to Kafkis, No. 3,739,420, granted on Jun. 19, 1973, for Device For Swabbing The Bore Of A Musical Instrument, discloses a polyurethane body. A cover sheet, such as a chamois, is disposed on the body for absorbing moisture. A flexible nylon cord is attached to the body for pulling the device through the bore of a musical instrument.

The U.S. Pat. to Koregelos, No. 4,114,504, issued on Sep. 19, 1978, for Demoisturizer For Wind Musical Instruments discloses a device for removing excess moisture from a wind instrument. The device includes an elongated member made of twisted wire. In the alternative, the elongated member may be made of plastic or wood.

The U.S. Pat. to Biasini, No. 4,407,182, granted on Oct. 4, 1983, for Musical Instrument Stand, discloses a musical instrument stand having a post secured to a base. The free end of the post projects into the interior of the musical instrument. The U.S. Pat. to Guinness, No. 3,151,517, issued on Oct. 6, 1964, for Musical Pipes, discloses a swab for musical pipes. The swab cleans the pipes and has a string for removing the swab.

In the U.S. Pat. to Millhouse, No. 1,421,529, issued on Jul. 4, 1922, for Cleaning Device, there is disclosed a cleaning device for wind instruments. The device comprises a closely wound spiral spring wire. Bristles are attached to a free end of the coiled wire by placing the bristles between pieces of soft wire and twisting the same together. One end of the twisted wire is wrapped with thread and screwed into the bore of the coiled wire.

SUMMARY OF THE INVENTION

A brush for cleaning the interior of an open-ended hollow structure in which brush bristles are secured to a wire. A section of the wire is free of brush bristles. The section of the wire free of brush bristles penetrates a solid non-abrasive, plastic cylindrical body to form a handle for the brush.

A brush for cleaning the interior of an open-ended hollow structure in which brush bristles are secured between a metallic member having a section thereof free of brush bristles. The section of the metallic member free of brush bristles is embraced by a non-abrasive, heat-shrinking plastic tube to form a handle for the brush.

A brush for cleaning the interior of an open-ended hollow structure in which brush bristles are secured between turns of twisted wire having a section thereof free of brush bristles.

The section of the twisted wire free of brush bristles is spaced apart in segmented relation and surrounded by a non-abrasive plastic cylindrical body to form a handle for the brush. The plastic cylindrical body surrounds the segmented section of the twisted wire and the space therebetween.

An object of the present invention is to provide a brush for cleaning the interior of an open-ended hollow structure which is economical to manufacture and yet has greater durability.

Another object of the present invention is to provide a brush for cleaning the interior of an open-ended hollow structure which does not kink, stretch out of shape, lodge within the hollow structure, reduce the wear of the hollow structure, scratch or otherwise deface the hollow structure, or impair the intended function of the hollow structure.

A feature of the present invention is that the non-abrasive heat-shrinking plastic tube is adaptable for slip-fitting over the member joined thereto for facilitating the connection therewith.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary elevation view of a brush embodying the present invention partially in section to illustrate the construction of the handle thereof.

FIG. **1A** is a fragmentary perspective view of one end of the brush shown in FIG. **1**.

FIG. **2** is a fragmentary elevation view of a modification of the brush shown in FIG. **1** partially in section to illustrate the construction of the handle thereof.

FIG. **2A** is a fragmentary perspective view of one end of the brush shown in FIG. **2**.

FIG. **3** is an elevation view of a single bristle end of a brush embodying the present invention partially in section to illustrate the construction of the handle thereof.

FIG. **3A** is a fragmentary perspective view of the brush end of the brush shown in FIG. **3**.

FIG. **4** is an elevation view of another brush having a single bristle end embodying the present invention.

FIG. **4A** is a fragmentary perspective view of the brush end of the brush shown in FIG. **4**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Illustrated in FIGS. **1** and **1A** is a brush **15** comprising, in the exemplary embodiment, twisted wires **16** and **17** at opposite ends thereof. The wires **16** and **17** are made of steel and are, respectively, approximately 0.017 of an inch in diameter. In the exemplary embodiment, the twisted wires **16** and **17** are made of galvanized steel. Secured between the turns of the twisted wires **16** and **17** in a well-known manner are suitable brush bristles **20** and **21**, respectively. The brush bristles **20** and **21** project radially outwardly from the wires **16** and **17**, respectively. The wires **16** and **17** include bristle free sections **16***a* and **17***a*, respectively.

Interconnecting the bristle free sections of the twisted wires **16** and **17**, respectively, is a flexible, non-abrasive, plastic cylindrical body **25**. In the preferred embodiment, the cylindrical body **25** is initially a solid cylindrical body and is made of high density polypropylene or nylon. In the exemplary embodiment, the cylindrical body **25** has a diameter of approximately 0.156 of an inch. The polypropylene and the nylon cylindrical body are well-known material and can be acquired from plastic distributors. The solid cylindrical body **25** serves as a handle for the brush **15**.

In the preferred embodiment, the solid cylindrical body **25** receives at the opposite free ends thereof the bristle free end sections **16***a* and **17***a*, respectively, of the twisted wires **16** and **17**. Toward this end, a drill-like tool is stationarily disposed on a support structure. A rotatable shaft is driven by an electric motor in a well-known manner. At the free end of the rotatable shaft is a suitable drill block for rotation therewith. The drill block receives the end of the twisted wire to which the brush bristles are secured for rotating the twisted wire. The bristle free end of the twisted wire rotates with the drill block. An operator urges one free end of the solid cylindrical body **25** against the rotating bristle free end of the twisted wire so that the bristle free end of the twisted wire penetrates one free end of the cylindrical body **25**. The penetration by the bristle free end of the twisted wire is along the axis or center line of the cylindrical body **25**. This results in the bristle free end of the twisted wire being fixedly secured to one end of the cylindrical body **25**.

A similar procedure is followed for fixedly securing the bristle free end of another twisted wire to the opposite end of the cylindrical body **25**. The twisted wire secured to the cylindrical body **25** is removed from the drill-like tool. Now, another twisted wire is inserted into the drill block for rotation therewith with the bristle free end thereof projecting outwardly from the drill block. The opposite free end of the cylindrical body **25** is now urged against the bristle free end of the other twisted wire so that the bristle free end of the other twisted wire penetrates the opposite free end of the cylindrical body **25** along the axis or center line of the cylindrical body **25**. This results in the bristle free end of the twisted wire being fixedly secured to the opposite end of the cylindrical body **25**.

Should it be desired to further secure, respectively, the bristle free sections **16***a* and **17***a* of the twisted wires **16** and **17** to the opposite ends of the cylindrical body **25**, a suitable adhesive or epoxy resin, such as Loctite No. 460, is applied to the bristle free end of the twisted wire while the twisted wire is penetrating the cylindrical body **25**.

The brush **15** is commonly referred to as a snake brush and it is suitable for the cleaning of tubular structures such as the tubes in musical wind instruments, the bore of rifles and the like. The brush **15** is capable of cleaning foreign matter from hollow structures with an open end without defacing or scratching the interior walls of the structure. There is no tendency to kink or remain lodged within tubes that are curved, such as found in various musical instruments. It has been found that the brush **15** is sufficiently flexible so as to follow the contour of curved tubular structures and particularly tubular structures having turns in excess of 180 degrees.

Illustrated in FIGS. **2** and **2A** is a brush **30**, which is a modification of the brush **15** shown in FIGS. **1** and **1A**. Therefore, parts of the brush **30** similar to the parts of the brush **15** will have the same reference numeral, but with a prime suffix.

The brush **30** differs from the brush **15** in that suitable metallic sleeves **31** and **32**, such as steel sleeves, are crimped or tightly fitted, respectively, over sections of the cylindrical body **25'** in which the bristle free ends **16***a'* and **17***a'* of the twisted wires **16** and **17** penetrate. The metallic sleeves **31** and **32** are contiguous to the adjacent ends of the bristles **20'** and **21'**, respectively.

Enveloping and embracing the sleeves **31** and **32**, respectively, are suitable plastic sheaths **33** and **34**. The plastic sheaths **33** and **34** extend, respectively, from the adjacent ends of the bristles **20'** and **21'** onto the sleeves **31** and **32**, respectively, and onto the adjacent sections of the cylindrical body **25'**.

A suitable adhesive or epoxy resin, such as Loctite No. 460, is interposed between the sheaths **33** and **34** and the sleeves **31** and **32**, respectively, and the respective confronting sections of the cylindrical body **25'**. The curing of the adhesive or epoxy resin additionally secures the ends of the cylindrical body **25'** and the confronting bristle free ends **16***a'* and **17***a'* of the twisted wires **16'** and **17'** in a tight fitting and durable arrangement to form secure joints therebetween.

Illustrated in FIGS. **3** and **3A** is a brush **40** comprising a twisted wire **41**. The twisted wire **41** is made of galva-

nized steel and is approximately 0.017 of an inch in diameter. Secured between the turns of the twisted wire **41**, in a well-known manner, are suitable brush bristles **42**. The brush bristles **42** project radially outwardly from the twisted wire **41** and, in the exemplary embodiment, the brush bristles taper toward the free end thereof. The twisted wire **41** includes a bristle free section **41***a*.

A non-abrasive, heat-shrinking plastic tube **43** slip-fits over the bristle free section **41***a* of the twisted wire **41**. The plastic tube **43** is then heated for heat-shrinking in a well-known manner. In so doing, the plastic tube **43**, after being subjected to heat shrinking, envelopes and embraces the bristle free section **41***a* of the twisted wire **41** in a tight fit. At the free end of the twisted wire **41** is formed a loop **41***b* of greater dimension than the diameter of the bristle free section **41***a*. The plastic tube **43**, the bristle free section **41***a* of the twisted wire **41** and the loop **41***b* form a handle for the brush **40**. The plastic tube **43**, before heat shrinking, is approximately 0.187 of an inch in diameter. Suitable heat-shrinking plastic tubes are well known in the plastic art.

In heat shrinking the plastic tube **43**, conventional heating devices may be employed. A shield is secured to the conventional heating device at the mouth of the heating tube to direct excessive heat away from the brush bristles and to protect the brush bristles. The shield is merely an angular disposed arcuate metallic plate, such as steel, that is disposed between the heating tube and the exposed brush bristles.

The tapered brush **40** is suitable for the cleaning of the interior of the mouthpiece of musical instruments, such as clarinets, alto saxophones and the like. The brush **40** cleans the interior of such mouthpieces without defacing or scratching the inner wall of the mouthpiece.

Illustrated in FIGS. **4** and **4A** is a brush **50** comprising, in the preferred embodiment, a twisted wire **51**. The twisted wire **51**, in the exemplary embodiment, is made of steel and is approximately 0.017 of an inch in diameter. Secured between the turns of the twisted wire **51**, in a well-known manner, are suitable brush bristles **52**. The brush bristles **52** project radially outward from the twisted wire **51**. The twisted wire **51** includes a bristle free section **51A**.

Spaced from the twisted wire **51** in the axial direction thereof is a twisted wire **53**. The twisted wires **51** and **53** are disposed in a spaced, segmented relationship. At the free end of the twisted wire **53** is formed a loop **53***a* of greater dimension that the diameter of the twisted wire **53**. In the exemplary embodiment, the twisted wire **53** is made of galvanized steel and is approximately 0.017 of a inch in diameter.

Interconnecting the bristle free section **51***a* of the twisted wire **51** and the confronting end of the twisted wire **53** is a flexible, non-abrasive plastic cylindrical body **55**. In the preferred embodiment, the cylindrical body **55** is initially a solid cylindrical body and is made of high density polypropylene or nylon. In the exemplary embodiment, the cylindrical body **55** has a diameter of approximately 0.187 of an inch. The polypropylene and nylon cylindrical bodies are well-known material and can be acquired from plastic distributors. The solid cylindrical body **55**, the twisted wire **53** and the bristle free section of the twisted wire **51** serve as a handle for the brush **50**.

In the preferred embodiment, the solid cylindrical body **55** receives at the opposite free ends thereof, the twisted wire **53** and the bristle free section **51***a* of the twisted wire **51**, respectively. Toward this end, a drill-like tool is stationarily disposed on a support structure. A rotatable shaft is driven by an electric motor in a well-known manner. At the free end of the rotatable shaft is a suitable drill block for rotation therewith. The drill block receives the handle **53***a* of the twisted wire **53** for rotating the twisted wire **53**. The free end of the twisted wire **53** rotates with the drill block. An operator uses one free end of the solid cylindrical body **55** against the rotating free end of the twisted wire **53** so that the free end of the twisted wire **53** penetrates one free end of the cylindrical body **55**. The penetration by the free end of the twisted wire **53** is along the axis or center line of the cylindrical body **25**. This results in the twisted wire **53** being fixedly secured to one end of the cylindrical body **25**.

The handle **53***a* is removed from the drill block. A similar procedure is followed for fixedly securing the bristle free end **51***a* of the twisted wire **51** to the opposite end of the cylindrical body **25**. The twisted wire **51** is inserted into the drill block for rotation therewith with the bristle free end **51***a* thereof projecting outwardly from the drill block. The opposite free end of the cylindrical body **55** is urged against the bristle free end **51***a* of the twisted wire **51** so that the bristle free end **51***a* of the twisted wire **51** penetrates the opposite free end of the cylindrical body **55** along the axis or center line of the cylindrical body **55**. This results in the bristle free end **51***a* of the twisted wire **51** being fixedly secured to the opposite end of the cylindrical body **55**.

Should it be desired to further secure, respectively, the twisted wire **53** and the bristle free section **51***a* of the twisted wire **51** to the opposite ends of the cylindrical body **55**, a suitable adhesive or epoxy resin, such as Loctite No. 460, is applied to the twisted wire **53** and the bristle free end **51***a* of the twisted wire **51** while the twisted wires **51** and **53** are penetrating the cylindrical body **55**.

The brush **50**, in the exemplary embodiment, has a cylindrical configuration for the brush bristles **52**. The cylindrical configuration makes the brush **50** particularly suitable for cleaning the interior of the valves of musical wind instruments without defacing or scratching the inner wall of such valves.

I claim:

1. A brush for cleaning the interior of an open-ended hollow member comprising:

(a) wire means having a section for the securement of brush bristles and a section thereof free of brush bristles;

(b) a group of brush bristles secured to said wire means at the section thereof for the securement of brush bristles; and

(c) a solid, flexible, non-abrasive, plastic cylindrical body surrounding and embracing said section of said wire means free of brush bristles along substantially the entire length thereof to protect the interior of an open-ended hollow member against marring by the brush and secured to said wire means for forming a handle for said brush, said solid cylindrical body being pierced and penetrated along the center line thereof at one end thereof by the section of said wire means free of brush bristles, said solid cylindrical body being flexible along substantially the entire length thereof.

2. A brush as claimed in claim **1** wherein said wire means is twisted at the section thereof for the secure-

ment of brush bristles to secure said group of brush bristles thereto by the turns thereof and is twisted at the section thereof free of brush bristles for the piercing and penetrating of said solid cylindrical body.

3. A brush as claimed in claim 1 and comprising another wire means spaced from said first-mentioned wire means, said other wire means having a section thereof for the securement of brush bristles and a section thereof free of brush bristles, another group of brush bristles secured to said other wire means at the section thereof for the securement of brush bristles, said solid cylindrical body being pierced and penetrated along the center line thereof by said section of said other wire means free of brush bristles at the end thereof opposite from said one end, said solid cylindrical body surrounding and embracing said section of said other wire means free of brush bristles along substantially the entire length thereof to protect the interior of the open-ended hollow member against marring by said brush.

4. A brush as claimed in claim 1 and comprising another twisted wire means spaced from said first-mentioned twisted wire means, said other twisted wire means having a section thereof for the securement of brush bristles and a section thereof free of brush bristles, another group of brush bristles secured to said other twisted wire means at the section thereof for the securement of brush bristles by the turns of said other twisted wire means, said solid cylindrical body being pierced and penetrated along the center line thereof by said section of said other twisted wire means free of brush bristles at the end thereof opposite from said one end, said solid cylindrical body surrounding and embracing said section of said other twisted wire means free of brush bristles along substantially the entire length thereof to protect the interior of the open-ended hollow member against marring by said brush.

* * * * *